

Role of Targeted Education in Promoting Voluntary Blood Donation Among Future Healthcare Professionals

Madiha^{1*}, Yumna Noor¹

¹Mayo Hospital Lahore, Punjab, Pakistan.

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***Corresponding Author:** Madiha
Email: madiha8974@gmail.com

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ABSTRACT

Voluntary blood donation is vital to modern healthcare, yet countries like Pakistan face ongoing shortages due to low donor turnout and misconceptions surrounding donation. Future healthcare professionals, particularly students in Allied Health Sciences, are strategically positioned to act as both donors and advocates for voluntary donation. This study evaluates the impact of targeted educational interventions on knowledge and attitudes toward blood donation among Allied Health students at the University of Child Health Sciences, PIMS, Islamabad. A total of 105 students from various disciplines participated in a structured, cross-sectional interventional study conducted between February and August 2024. Baseline assessments revealed moderate knowledge levels and limited willingness to donate. Students underwent a two-week educational program incorporating multimedia modules, discussions, and live demonstrations. Post-intervention assessments conducted 30 days later showed a statistically significant increase in both knowledge and positive attitudes ($p < 0.001$). The proportion of students with good knowledge rose from 5.7% to 94.3%, while willingness to donate increased from 48.6% to 91.4%. Notably, improvements were consistent across all disciplines, suggesting the intervention's wide applicability. The findings highlight that targeted, interactive educational efforts can effectively address cognitive and emotional barriers to donation. Integrating such strategies into health sciences curricula may not only enhance student knowledge but also foster long-term donor engagement and public health advocacy. Future research should explore long-term retention and behavioral outcomes.

Keywords: Voluntary blood donation, Allied Health students, educational intervention, transfusion medicine, donor attitudes

INTRODUCTION

Voluntary blood donation is a cornerstone of modern healthcare systems, essential for ensuring the timely availability of safe blood for transfusion, especially in emergencies, surgeries, and for patients with chronic conditions such as thalassemia, hemophilia, and malignancies (Gasparovic Babic, Krsek, & Baticic, 2024; Erhabor et al., 2023). According to the World Health Organization (WHO), over 118 million blood donations are collected globally each year, yet many low- and middle-income countries, including Pakistan, face critical shortfalls in blood supply due to low donor turnout and overreliance on family/replacement donors (Fung et al., 2023). The promotion of voluntary, non-remunerated blood donation remains a public health priority to enhance safety, reliability, and sustainability of blood supplies (Assi et al., 2024; Guglielmetti Mugion et al., 2021). In Pakistan, voluntary blood donation rates remain suboptimal, with studies indicating that a significant proportion of the population lacks basic knowledge about blood group systems, eligibility criteria for

donation, and the safety of the donation process (Jamal et al., 2023; Saqlain et al., 2024). Common barriers include fear of needles, concerns about weakness or health risks post-donation, and widespread myths or cultural misconceptions (Arshad et al., 2024). These challenges are further compounded by the absence of structured educational frameworks that address these gaps, particularly among students in Allied Health Sciences disciplines who will play crucial roles in healthcare delivery in the near future.

Previous research has demonstrated that healthcare students are potential key influencers in promoting health-related behaviors, including blood donation, within their communities (Duh & Dabula, 2021). However, studies also suggest that despite their educational background, many students in Allied Health and Nursing programs exhibit limited knowledge and neutral or negative attitudes toward blood donation (Martínez-Santos et al., 2021). Bridging this knowledge-attitude gap through targeted educational interventions is therefore

imperative. Well-designed educational programs can foster both cognitive and affective improvements, equipping students not only with factual information but also with the motivation and confidence to donate and advocate for voluntary donation (Mohammed et al., 2022; Jenkin et al., 2023).

Educational interventions in health sciences curricula have shown significant promise in other domains, such as hand hygiene, vaccination awareness, and antimicrobial resistance (Singh & Barnard, 2023; Buregyeya et al., 2021). However, the literature remains limited regarding the impact of such strategies specifically focused on blood donation among Allied Health Sciences students in the South Asian context. In particular, there is a paucity of interventional studies that combine various pedagogical techniques—such as small-group discussions, multimedia content, and practical demonstrations—to holistically enhance understanding and resolve psychological barriers.

The relevance of this issue is amplified in Pakistan, where the healthcare system is heavily dependent on blood transfusions for managing trauma, obstetric emergencies, and hematological disorders (Al-Attar et al., 2023; Riaz et al., 2022). The country also struggles with inadequate donor pools and a high prevalence of transfusion-transmissible infections (TTIs), which further underscores the need for educated and voluntary blood donors. Engaging Allied Health Sciences students—who frequently interact with both patients and the broader community—as informed donors and advocates represents a strategic intervention that could contribute significantly to improving national blood donation rates and transfusion safety (Angus, Hattingh, & Weir, 2022; Hofmann, Spahn, & Holtorf, 2021).

By focusing on a population of future healthcare workers, this study not only assesses the immediate impact of educational interventions but also explores their potential long-term implications for public health advocacy and donor mobilization. The findings may offer valuable insights for curriculum developers, policymakers, and healthcare educators seeking to strengthen blood donation programs and promote a culture of voluntary donation within the healthcare workforce.

METHODOLOGY

This cross-sectional interventional study was conducted in the Department of Hematology and Transfusion Medicine at the University of Child Health Sciences, Pakistan Institute of Medical Sciences (PIMS), Islamabad, from February to August 2024. The primary objective was to evaluate the

impact of targeted educational strategies on the knowledge and attitudes of Allied Health Sciences students regarding blood groups and voluntary blood donation.

Participants were recruited through purposive sampling from various Allied Health disciplines, including Medical Laboratory Technology, Radiologic Technology, and Operation Theater Technology. A total of 105 students voluntarily participated in the study after providing informed consent. Prior to the intervention, a structured, self-designed questionnaire was administered to assess baseline knowledge and attitudes toward blood donation. The questionnaire comprised multiple-choice and Likert-scale items focusing on blood group systems, donor eligibility, donation frequency, and perceived barriers to blood donation.

Following baseline assessment, participants underwent a series of structured educational interventions, which included small group discussions, video-based learning modules, and live demonstrations on blood donation procedures and safety protocols. These interventions were designed to address gaps identified in the pre-assessment and were delivered over a span of two weeks. A post-intervention assessment using the same questionnaire was conducted 30 days after the educational sessions to evaluate knowledge retention and attitudinal changes.

Data were analyzed using SPSS version 23. Descriptive statistics, including means and standard deviations for continuous variables and frequencies for categorical data, were computed. The Wilcoxon signed-rank test and McNemar's test were applied to assess the significance of differences between pre- and post-intervention scores. A p -value <0.05 was considered statistically significant. The reliability of the questionnaire was established through a pilot study conducted on a subset of 15 students not included in the final analysis. Cronbach's Alpha coefficient for internal consistency was calculated to be 0.82, indicating good reliability.

Ethical approval was obtained from the institutional review board prior to study commencement, and the study adhered to the ethical standards outlined in the Declaration of Helsinki.

RESULTS

A total of 105 students participated in the study, comprising 16 (15.2%) males and 89 (84.8%) females. The mean age of the participants was 21.3 ± 1.4 years. The baseline knowledge assessment revealed that a majority of students (83.8%) demonstrated moderate knowledge about blood groups and donation, while 10.5% had poor

knowledge and only 5.7% showed good knowledge prior to the intervention.

Following the educational interventions, a statistically significant improvement was observed in overall knowledge scores ($p < 0.001$). The proportion of students achieving good knowledge increased from 5.7% pre-intervention to 94.3% post-intervention. Domain-specific improvements were particularly notable in questions related to donor eligibility, Rh incompatibility, and donation frequency.

Table 1: Pre- and Post-Intervention Knowledge Levels

Knowledge Level	Pre-Intervention n (%)	Post-Intervention n (%)
Poor (score < 40%)	11 (10.5%)	0 (0%)
Moderate (40-69%)	88 (83.8%)	6 (5.7%)
Good ($\geq 70\%$)	6 (5.7%)	99 (94.3%)

At baseline, Medical Laboratory Technology (MLT) students demonstrated higher knowledge scores compared to students from other Allied Health disciplines. However, post-intervention assessments showed uniform improvement across all disciplines, minimizing the inter-group variability.

Table 2: Mean Knowledge Scores by Discipline (Pre and Post)

Discipline	Pre-Mean \pm SD	Post-Mean \pm SD	p-value
MLT (n=40)	58.4 \pm 8.3	91.2 \pm 4.5	<0.001
Radiologic Technology (n=35)	52.9 \pm 7.9	89.6 \pm 5.2	<0.001
Operation Theater Tech (n=30)	50.1 \pm 6.5	88.7 \pm 6.1	<0.001

Prior to the intervention, only 48.6% of students expressed a willingness to donate blood in the future. Post-intervention, this increased significantly to 91.4% ($p < 0.001$). Similarly, students' belief in the safety of blood donation improved from 61.0% to 95.2%.

Table 3: Change in Attitudes Pre- and Post-Intervention

Attitudinal Aspect	Pre n (%)	Post n (%)	p-value
Willing to donate blood in future	51 (48.6%)	96 (91.4%)	<0.001
Belief that blood donation is safe	64 (61.0%)	100 (95.2%)	<0.001
Awareness of own blood group	81 (77.1%)	105 (100%)	<0.001
Perceived barriers to donation (e.g., fear, weakness)	72 (68.6%)	24 (22.9%)	<0.001

The results indicate that structured educational interventions significantly enhanced the knowledge and positive attitudes of Allied Health Sciences

students regarding blood donation. The findings underscore the effectiveness of targeted education in fostering a more informed and willing cohort of future healthcare professionals to participate in voluntary blood donation programs.

DISCUSSION

The present study highlights the significant impact of targeted educational interventions on enhancing both the knowledge and attitudes of Allied Health Sciences students toward blood donation. The substantial improvement observed in knowledge scores and the increased willingness to donate blood post-intervention underscore the critical role of structured, interactive educational strategies in promoting voluntary blood donation among future healthcare professionals.

At baseline, the majority of participants demonstrated only moderate understanding of key concepts related to blood groups and donation, with evident gaps in knowledge concerning Rh incompatibility, donor eligibility criteria, and safe donation practices. These findings are consistent with earlier studies conducted in similar populations, which have reported limited awareness and misconceptions as major barriers to active participation in blood donation programs. However, following the interventions, a significant rise in knowledge levels was noted, with 94.3% of students achieving a good knowledge score—emphasizing that even short-duration, focused educational modules can effectively bridge existing knowledge gaps.

The improved post-intervention willingness to donate blood (rising from 48.6% to 91.4%) also reflects a positive attitudinal shift. This is in line with prior studies suggesting that knowledge gain is a strong predictor of behavioral intention in health-related practices. Notably, students also reported reduced fear and fewer misconceptions about the process of donation, suggesting that addressing emotional and psychological barriers through education can be equally important as delivering factual knowledge.

Interestingly, while students from the Medical Laboratory Technology discipline initially demonstrated higher baseline knowledge, post-intervention results revealed a leveling effect across all disciplines. This uniformity highlights the inclusivity and effectiveness of the educational content, regardless of prior exposure or training background.

This study adds to the growing body of evidence supporting the integration of transfusion medicine and voluntary donation awareness into

undergraduate Allied Health curricula. Early sensitization of healthcare students may not only increase their individual participation in donation but also prepare them as informed advocates capable of influencing the wider community in their future professional roles.

Despite the positive outcomes, this study is not without limitations. The use of a self-designed questionnaire, while tailored to the study objectives, may limit comparability with other studies. Additionally, the follow-up period was restricted to 30 days; longer-term retention of knowledge and actual donation behavior were not assessed. Future research should explore longitudinal effects of such interventions and include behavioral outcomes such as actual donation rates.

In conclusion, the findings strongly support the incorporation of structured educational programs within Allied Health education to foster a knowledgeable and proactive attitude toward voluntary blood donation. Empowering future healthcare professionals with both knowledge and motivation is a critical step toward ensuring a stable and safe blood supply in the long term.

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CONCLUSION

This study demonstrates that targeted educational interventions significantly enhance both the knowledge and attitudes of Allied Health Sciences students regarding voluntary blood donation. Structured sessions addressing cognitive and psychological barriers led to a marked increase in willingness to donate and understanding of donation safety and eligibility. The intervention proved effective across all student disciplines, indicating its broad utility in health education. By equipping future healthcare professionals with accurate knowledge and positive attitudes, such initiatives have the potential to expand the donor pool and promote a culture of voluntary donation. These findings underscore the importance of integrating transfusion medicine awareness into undergraduate curricula as a sustainable strategy to improve blood donation rates and transfusion safety. Long-term research is recommended to evaluate actual donor behavior and knowledge retention over time, further guiding public health policy and curriculum development.

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